

**What is claimed is:**

1. A polymer electrolyte fuel cell stack comprising:  
a plurality of unit cells, each of which is provided with:  
a membrane electrode assembly having a pair of electrodes between  
5 which a solid polymer membrane is sandwiched; and  
separators between which the membrane electrode assembly is  
sandwiched;  
a gas supply manifold supplying reaction gases to each of the plurality of  
unit cells;  
10 a gas exhaust manifold through which the reaction gases are exhausted; and  
a pressure loss control mechanism controlling the reaction gases passing  
through the gas supply manifold, respective flow passages of the plurality of unit  
cells and the exhaust manifold to control pressure loss of at least one of the gas  
supply manifold and the gas exhaust manifold corresponding to the flow rates of  
15 the reaction gases in a way to establish a predetermined ratio between the pressure  
loss of at least one of the gas supply manifold and the gas exhaust manifold and  
pressure loss in the respective flow passages of the plurality of unit cells.
2. The polymer electrolyte fuel cell stack according to claim 1, wherein the  
pressure loss of at least one of the gas supply manifold and the gas exhaust  
20 manifold is controlled so as to decrease as the flow rates of the reaction gases  
decreases.
3. The polymer electrolyte fuel cell stack according to claim 1, wherein the  
pressure loss control mechanism includes a movable member disposed in at least  
one of the gas supply manifold and the gas exhaust manifold.
- 25 4. The polymer electrolyte fuel cell stack according to claim 3, wherein moving  
the movable member allows control of at least one of an area of each of supply  
ports through which the reaction gases are supplied from the gas supply manifold  
to the plurality of unit cells and an area of each of exhaust ports through which the  
reaction gases are exhausted from the plurality of unit cells to the gas exhaust  
30 manifold.

5. The polymer electrolyte fuel cell stack according to claim 4, wherein the pressure loss control mechanism has through-holes, associated with at least one of the supply ports and the exhaust ports, whereby moving the pressure loss control mechanism allows control of at least one of the area of each of the supply ports and the area of each of the exhaust ports.

6. The polymer electrolyte fuel cell stack according to claim 5, wherein a reduction ratio of at least one of the area of each of the supply ports and the area of each of the exhaust ports resulting from movement of the movable member is set depending upon each of the plurality of unit cells.

7. The polymer electrolyte fuel cell stack according to claim 1, wherein the pressure loss control mechanism includes a plurality of movable members disposed in at least one of the gas supply manifold and the gas exhaust manifold, and the plurality of movable members are associated with at least one of supply ports through which the reaction gases are supplied from the gas supply manifold to the plurality of unit cells and exhaust ports through which the reaction gases are exhausted from the plurality of unit cells to the gas exhaust manifold, whereby moving the movable members allows at least one of an area of each of the supply ports, through which the reaction gases are supplied from the gas supply manifold to the plurality of unit cells, and an area of each of the exhaust ports, through which the reaction gases are exhausted from the plurality of unit cells to the gas exhaust manifold, to be independently controlled.

8. The polymer electrolyte fuel cell stack according to claim 7, wherein a reduction ratio of at least one of the area of each of the supply ports and the area of each of the exhaust ports resulting from movement of the movable members is independently controlled in accordance with each of the plurality of unit cells.

9. The polymer electrolyte fuel cell stack according to claim 3, wherein the movable member is disposed in opposition to at least one of supply ports, through which the reaction gases are supplied from the gas supply manifold to the plurality of unit cells, and exhaust ports, through which the reaction gases are exhausted from the plurality of unit cells to the gas exhaust manifold, to variably

control a distance between the movable members and at least one of the supply ports and the exhaust ports.

10. The polymer electrolyte fuel cell stack according to claim 9, wherein the distance between the movable member and at least one of the supply ports and the exhaust ports is set depending upon each of the plurality of unit cells.

11. The polymer electrolyte fuel cell stack according to claim 1, wherein the pressure loss control mechanism includes a plurality of movable members associated with at least one of the gas supply manifold and the gas exhaust manifold, and the plurality of movable members are disposed in opposition to at least one of supply ports, through which the reaction gases are supplied from the gas supply manifold to the plurality of unit cells, and exhaust ports, through which the reaction gases are exhausted from the plurality of unit cells to the gas exhaust manifold, to allow a distance between the plurality of movable members and at least one of the supply ports and the exhaust ports to be independently controlled.

12. The polymer electrolyte fuel cell stack according to claim 11, wherein the distance between the plurality of movable members and at least one of the supply ports and the exhaust ports is independently controlled in accordance with each of the plurality of unit cells.

13. The polymer electrolyte fuel cell stack according to claim 1, further comprising a clogged condition detector detecting a clogged condition resulting from condensed water in the flow passage of at least one unit cell of the plurality of unit cells,

wherein the pressure loss control mechanism control the pressure loss so as to alleviate the clogged condition.

14. The polymer electrolyte fuel cell stack according to claim 1, further comprising a residual hydrogen detector detecting a residual hydrogen quantity in the flow passage of each of the plurality of unit cells,

wherein the pressure loss control mechanism controls the pressure loss such that the smaller the residual hydrogen quantity in a unit cell among the plurality

of unit cells is, the larger a quantity of hydrogen is supplied to the unit cell.

15. A polymer electrolyte fuel cell stack comprising:

a plurality of unit cells, each of which is provided with:

a membrane electrode assembly having a pair of electrodes between  
5 which a solid polymer membrane is sandwiched; and

separators between which the membrane electrode assembly is  
sandwiched;

a gas supply manifold supplying reaction gases to each of the plurality of  
unit cells;

10 a gas exhaust manifold through which the reaction gases are exhausted; and

pressure loss control means for controlling the reaction gases passing through  
the gas supply manifold, respective flow passages of the plurality of unit cells and  
the exhaust manifold to control pressure loss of at least one of the gas supply  
manifold and the gas exhaust manifold corresponding to the flow rates of the  
15 reaction gases in a way to establish a predetermined ratio between the pressure  
loss of at least one of the gas supply manifold and the gas exhaust manifold and  
pressure loss in the respective flow passages of the plurality of unit cells.

16. A method of controlling pressure loss in a polymer electrolyte fuel cell  
stack having a plurality of unit cells, each of which is provided with: a membrane  
20 electrode assembly having a pair of electrodes between which a solid polymer  
membrane is sandwiched; and separators between which the membrane electrode  
assembly is sandwiched; and a gas supply manifold supplying reaction gases to  
each of the plurality of unit cells; a gas exhaust manifold through which the  
reaction gases are exhausted, the method comprising:

25 controlling the reaction gases passing through the gas supply manifold,  
respective flow passages of the plurality of unit cells and the exhaust manifold to  
control pressure loss of at least one of the gas supply manifold and the gas exhaust  
manifold corresponding to the flow rates of the reaction gases in a way to  
establish a predetermined ratio between the pressure loss of at least one of the gas  
30 supply manifold and the gas exhaust manifold and pressure loss in the respective

flow passages of the plurality of unit cells.